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GLOSSARY OF  
MISSILE TERMINOLOGY  
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56

## GLOSSARY

### A

**ABORT:** A halt in countdown after first engine ignition.

**ACCELERATION, LINEAR.** The time rate of change of linear velocity, where the velocity is referred to a coordinate frame, usually fixed with respect to the earth.

**ACCEPTANCE TEST:** A test, or series of tests, conducted in accordance with military specifications on each production article to determine if the performance of the article is within the limits specified in the model specifications.

**ACCUMULATOR, HYDRAULIC:** A cylindrical chamber, fitted with a movable concave piston, which smooths pressure surges in the system. It also <sup>functions as</sup> ~~is a~~ source of supplementary hydraulic pressure during periods of high system demand.

**ACTIVE DEFENSE:** Those aspects of a weapons system which are intended to decrease the probability of damage from enemy action.

**ACTUATING DEVICE:** Refer to ACTUATOR.

**ACTUATING SYSTEMS:** The systems in a missile that supply energy for the operation of mechanisms or equipment. Actuating systems including electrical, hydraulic, pneumatic, mechanical, and other methods of <sup>supplying</sup> ~~actuating~~ energy.

**ACTUATOR, HYDRAULIC:** A cylinder and piston assembly which moves a thrust chamber or rocket engine to change direction of thrust.

**ADDRESS:** A numerical expression which designates a particular location in a memory device.

**ADJUSTING:** Returning out-of-tolerance condition to an in-tolerance condition by manipulating or changing adjustment controls.

## GLOSSARY

**AFTERBURNING:** The irregular burning of fuel in the atmosphere after the main combustion for thrust in a rocket engine has ceased.

**AIRFRAME:** The assembled structural and aerodynamic components of a missile.

**AIR VEHICLE:** The airborne portion of an air weapons system which carries the armament system or other payload and whose trajectory is capable of being altered subsequent to its launch by forces generated from within the vehicle.

**ALIGN:** To position two or more components in correct relationship to each other.

**ALTITUDE, ABSOLUTE:** Altitude with respect to the surface of the earth as differentiated from altitude with respect to sea level.

**ANALOG PROGRAMMER:** The automatic control system which sends commands to the missile systems checkout programmer (APCHE) during propellant utilization system checkout.

**ANALYSTS PANEL:** A unit of the countdown and monitoring console which is provided with indicators that permit the progress of system functions to be observed.

**ANGLE OF ATTACK:** The angle between the direction of motion of the re-entry vehicle and its longitudinal axis.

**ANGLE OF THRUST:** The difference in degrees between the direction of thrust controlled by the position of the thrust chambers and a zero reference line through the longitudinal axis of the missile.

**ANGULAR COORDINATE:** A position in space expressed in the number of degrees of displacement from two or more reference axes.

**ANGULAR DISPLACEMENT:** The amount of rotation in degrees of the arc of a gyro spin wheel or other device from a fixed axial position in space.

**ANGULAR RATE 1:** The rate of change (in feet per second) in the position of the missile running parallel to ~~XEM~~ an axis through rate stations 1 and 3.

## GLOSSARY

**ANGULAR RATE 2:** The rate of change (in feet per second) in the position of the missile running parallel to an axis through rate stations 2 and 4.

**ANGULAR VELOCITY:** The rate of rotation or displacement in degrees of an arc per-unit-time of a gyro spin wheel or other device.

**ANGULAR VELOCITY INPUT:** The magnitude or amount of electrical signal generated is a result of the rate at which a gyro spin wheel is displaced or rotated from a null position in terms of degrees of arc-per-unit of time.

**APCHE:** Refer to MISSILE SYSTEMS CHECKOUT PROGRAMMER.

**APOGEE:** The point of greatest distance from earth in the trajectory of a ballistic missile.

**AREA RATIO:** Refer to EXPANSION AREA RATIO.

**ARM:** To prepare ~~the missile for its function~~ a circuit or mechanism to receive a signal that enables its function to be performed.

**ARMAMENT DIRECTING SYSTEM:** The portion of an armament system which consists of the target detecting, tracking, ranging, and computing equipment.

**ARMAMENT SYSTEM:** The portion of a guided missile which directly inflicts damage on the enemy.

**ARRAY:** A system of antennas used for directional reception and transmission.

**ASSEMBLY:** Refer to COMPONENT.

**ASSOCIATE CONTRACTORS:** The major manufacturers of the missile and its ground support equipment.

**ATMOSPHERE, STANDARD:** A consistent set of atmospheric properties accepted as standard.

**ATTENUATOR:** An arrangement of variable resistors used to reduce the strength of a signal without causing distortion.

**ATTITUDE, FLIGHT:** The position which the missile assumes in flight, stated in terms of pitch, yaw, and roll angles.

## GLOSSARY

AUGMENTOR: A duct usually enclosing the exhaust jet behind the nozzle exit section whose function is to provide increased thrust.

AUTOMATIC PROGRAMED CHECKOUT EQUIPMENT (APCHE): Refer to MISSILE SYSTEMS CHECKOUT PROGRAMMER (APCHE).

AUXILIARY SYSTEM: A system that serves as an aid or adjunct to the basic systems of a missile in the performance of its mission.

AZIMUTH: The clockwise angle in degrees between north and the projection of the line of sight to the missile on the horizontal plane.

## GLOSSARY

### B

**BACKUP:** A reserve or substitute method or item for more efficient operation or emergency use.

**BALLISTIC:** The propulsion or hurling of an explosive through the air.

**BALLISTIC TRAJECTORY:** The line of flight followed by the re-entry vehicle after it is freed from the missile.

**BALL-LOCK PIN:** A pin composed of a metal shaft with a spring-loaded, recessed ball at one end. When the pin is inserted through a hole, the ball is released, protrudes through the shaft, and locks the pin.

**BEACON:** Point source of radio energy on which receiving antennas can be trained.

**BENCH MAINTENANCE:** Missile maintenance done in the squadron maintenance area (SMA) or suitable for being done there.

**BEZEL:** The grooved rim or flange in which an indicator crystal is set.

**BIPROPELLANT:** Two substances used for fuel and oxidizer to generate thrust.

**BINARY CODE OR SYSTEM:** A number system which uses two symbols (0 and 1) and has two as its base.

**BISTABLE:** Being always in one or the other of two stable states.

**BIT:** A binary digit (1 or 0).

**BLACK BOX:** An element of the weapon system which may be removed and replaced as a single unit.

**BLANKET PRESSURIZATION:** Low pressure of 5.5 or 2.2 psi applied to fuel and liquid oxygen transfer system lines during periods of idleness to prevent contamination of transfer lines or separation of water from the liquids.

**BLEED:** To drain off liquid or gas.

**BLEED-CYCLE OPERATION:** The operation which takes place in liquid rocket engines when the turbopump is driven by hot gases bled from the combustion chamber of the main thrust chamber assembly.

**BLEED VALVE:** A valve which allows fluid to be released at a given rate.

## GLOSSARY

BLOWDOWN: Reduction of <sup>pneumatic</sup> pressure in the holddown and release cylinder from 5500 psig to 250 psig maximum residual pressure.

BLOWOUT DISC: A thin metal diaphragm used as a safety device <sup>C</sup> to relieve excessive gas pressure.

BOOSTER ENGINE: A part of ~~rocket~~ <sup>engine</sup> propulsion system used to assist the sustainer <sup>in</sup> accelerating the missile from launch to cutoff velocity.

BOOSTER SECTION: The jettisonable aft section of the missile containing the booster engine and associated equipment.

BOOSTER TURBINE EXHAUST: Ducts and manifolds which direct booster turbine exhaust gas overboard.

BOOTSTRAP: The point in engine operation when turbopump propellant pressures become sufficient to supply the turbopump gas generators with propellants from the main propellant system. At bootstrap the engine start system is automatically cut out of the engine propellant supply system.

BRIDGE CIRCUIT: An electrical circuit used to sense voltage differences between two points.

BRIDGE ERROR DETECTOR: A capacitor-resistor bridge which <sup>T</sup> compares the capacitance ratio of the manometers to a fixed resistance ratio.

BUS BAR. One of the main bars or conductors carrying an electrical current.



## GLOSSARY

### C

**CABLING DISC:** The flat cylinders of the ~~amplifier~~ <sup>programmer-integrator-</sup> canister imprinted with etched-circuit cabling.

**CAM SHAFT:** A shaft upon which cams are mounted to actuate microswitches in the flight programmer subassembly.

**CANCELLATION:** An incident during precountdown or countdown activities which causes a launch rescheduling or a shift to use of another missile.

**CANISTER:** A sealed cylindrical container for electrical or electronic equipment.

**CAPTIVE FIRING:** Refer to STATIC FIRING.

**CARRIER:** An electrical signal or radio wave of a fixed frequency that is modulated to carry some form of intelligence.

**CATALYST OR CATALYTIC AGENT:** Any substance which, by virtue of its presence, affects the rate of a chemical reaction and which may be recovered practically unchanged at the end of the reaction.

**CAUSEWAY:** A level, bridge-like structure extending from the roof of the launch and service building to the access road.

**CAVITATION:** The formation and collapse of vapor <sup>b</sup>bubbles in a liquid when the local static pressure is less than the head pressure created by a moving object.

**CAVITY:** The depression in flat cylinder subassemblies used to accommodate subsystem components.

**CHAMBER BODY:** The walls of a combustion chamber.

**CHAMBER PRESSURE:** The pressure (psia) in the combustion chamber.

## GLOSSARY

**CHARACTERISTIC VELOCITY:** A theoretical velocity calculated as the product of the chamber pressure (psia), the nozzle throat area (square inches), and the gravitational conversion factor divided by the mass flow (lbm/sec).

**CHARACTERISTIC LENGTH:** Ratio of combustion chamber volume to the nozzle throat area.

**CHECKOUT:** The performance of a test or series of tests designed to verify and validate that the operational characteristics of missile equipment are within specified limits.

**CHECKOUT EQUIPMENT:** Test units used to verify the flight-readiness of the various missileborne systems.

**CHECKOUT MODE:** The condition of the flight control system when it is connected to the system checkout equipment.

**CHECK VALVE:** A valve which permits fluid to flow in one direction only.

**CIRCLE OF ERROR PROBABILITY (CEP):** A circle centered on the target in which half of all warheads fired at the target will land.

**CLIMATIZATION:** All measures taken to provide for the satisfactory operation, packaging, transportation, and storage of ground equipment regardless of climatic conditions.

**CLOSURE:** A cap or cover used to seal an opening.

**COAXIAL CABLE:** A transmission line in which one conductor completely surrounds the other. The two conductors are coaxial and separated by a continuous dielectric.

**COLLIMATION:** The process of adjusting an instrument or device so that its reference axis is aligned in a desired direction within a predetermined tolerance.

**COMBUSTION:** A chemical process characterized by the evolution of heat. Commonly, the chemical reaction of fuel and oxidizer, but it includes the burning of solid propellants.

## GLOSSARY

**COMBUSTION CHAMBER:** An enclosed <sup>V</sup>/<sub>A</sub> volume in which a controlled combustion takes place.

**COMBUSTION CHAMBER LENGTH:** The length of the combustion chamber from the injector face to the section through the nozzle throat.

**COMBUSTOR:** A chamber in which fuel and oxidizer are burned.

**COMMAND DESTRUCT SIGNAL:** A signal sent by the Range Safety Officer to cause the missile to be destroyed before it reaches the end of its trajectory.

**COMMAND OVERRIDE:** The ability of a superior rank to supersede in transmission, reception, or both.

**COMMERCIAL PARTS:** Articles purchased from outside sources under the vendor's part name and number.

**COMPLEX:** A collection of facilities and equipment for a specific purpose.

**COMPOSITE SYSTEM:** Interconnected systems and subsystems.

**COMPONENT TEST EQUIPMENT:** The equipment, composed of the component checkout unit, used to perform proof pressure tests, flow tests, and electrical tests on parts of hydraulic and pneumatic components.

**COMPONENT:** A combination of units or parts that together may be functionally independent of, or an independent entity within a complete operating module, subsystem, or system operation.

**COMPUTER:** A device which accepts data and problems and supplies answers.

**CONFIDENCE FLIGHT:** A practice flight on the target range to provide training for the launch crew.

**CONFIDENCE INDICATOR:** A display which shows the operational condition of a designated circuit.

**CONSOLE:** A desk-like unit fitted with panels containing indicators and controls.

## GLOSSARY

CONSTANT-FLOW VALVE\*. A valve which allows gas to flow at a fixed rate.

CONTRACTION AREA RATIO: The numerical value of the maximum combustion chamber cross-sectional area divided by the nozzle throat area.

CONTROL, AUTOMATIC: An automatic process in which ~~both~~ a variable is measured, and when the measured value exceeds desired limits, corrective action is taken to return it to within those limits.

CONTROL ELEMENT: A device which receives a control signal from a controller and manipulates accordingly the variable to be controlled. Also called an EFFECTOR.

CONTROLLED RELEASE: The limiting of the initial acceleration of a missile during the first few inches of rise.

CONTROLLER: A device which receives a measured value of a variable within a certain range about the reference value.

CONTROLLING MECHANISM: Refer to CONTROLLER.

COOLANT TUBES: Tubes within the thrust chamber body used to cool the chamber walls during engine firing. Cooling is accomplished by the circulation of oxidizer through the tubes.

CORRECTIVE MAINTENANCE: Finding and correcting faults, damage, or wear.

COTAR: A phase-comparison radio measuring system for determining missile position.

COUNTDOWN: A controlled sequence of events ending in the launching of a missile.

COUNTDOWN AND MONITORING CONSOLE: A console fitted with controls and indicators required to bring a missile and its associated ground support equipment (GSE) from standby status to the point of readiness for the missile commit sequence. In addition, displays are provided to enable the Systems Analyst to locate and identify any malfunction indicated on the analyst panel.

## GLOSSARY

**COUNTER:** A register that contains an integer which is increased by one (up-counter) or decreased by one (down-counter) with each successive input pulse.

**CROSS COUPLING:** Undesirable orientation of a gyro resulting from an incorrect missile attitude, thereby causing the gyro to sense attitude change in more than one of the three flight axes.

**CUTOFF:** The shutting off of propellant flow to an engine.

**CYCLIC REPLACEMENT:** Adjustment, repair, or replacement after a given elapsed time, operating time, or number of operating cycles.

## GLOSSARY

### D

**DAMPING:** Reduction of the rate of oscillation of an object to a value below a critical value.

**DAMPING GAP:** The area between the inner and outer gimbal of a gyroscope which contains fluid used to damp and float the inner gimbal.

**DEENERGIZE:** To remove power from a system or subsystem.

**DEGREASER:** A material which is heated for cleaning, descaling, and degreasing engine parts. The mechanical device in which the material is prepared and used is also called a DEGREASER.

**DELUGE WATER:** Water poured on a flame reflector to prevent damage from rocket blast.

**DEMODULATOR:** An electronic unit used as a rectifier or detector to separate the modulation frequency from the carrier frequency.

**DENSITY ALTITUDE:** The altitude corresponding to the measured air density (the air density calculated from measured temperature and pressure) as determined by reference to the Standard Atmosphere tables.

**DENSITY OF SEA-LEVEL AIR, STANDARD:** The numerical value of the international sea-level air density adopted at 0.07651 lbm/cu ft or 0.002378 slug/cu ft.

**DEPOT MAINTENANCE:** Major repair or overhaul outside of the squadron area.

**DEPRESSURIZE:** To relieve pressure contained within a system or component by venting to atmosphere.

**DESTRUCTOR:** An explosive or other device for intentionally breaking up or destroying a missile or a component thereof.

**DETONATION, LOW ORDER:** A partial or slow explosion.

**DETONATOR:** An explosive device, sensitive to electrical or mechanical impulse.

**DESICCANT:** A substance used to absorb moisture for <sup>the purpose of humidity</sup> ~~environmental~~ control.

**DETOMATION:** An explosion, whether chemical, atomic, or thermonuclear.

## GLOSSARY

**DEVELOPMENT:** The application of known scientific facts, techniques, materials, and physical laws to the creation of new or improved material or methods.

**DEVELOPMENT TEST:** A test made by the developing agency to verify the operation or performance of a system or component design, or to produce data which will permit improving the design of the item under test.

**DIAGNOSTIC ROUTINE:** A test routine designed to locate either a malfunction in the computer or a mistake in coding.

**DIGITAL:** Representation of numbers by digits in accordance with some system of positional notation.

**DIGITAL COMPUTER:** A computer in which quantities are represented numerically.

**DIGITAL TO ANALOG:** The use of physical variables, such as distance or voltage, to represent numerical values.

**DISARM:** To prevent a circuit or mechanism from receiving a signal that would cause the untimely execution of its function.

**DISCRETE COMMAND:** A command signal used to activate missile functions (other than guidance functions), such as staging and sustainer shutoff.

**DISPLACEMENT GYRO:** A gyro which provides an electrical signal proportionate to its angular displacement from a null reference line which is oriented in the pitch, roll, or yaw axis.

**DWN TIME:** The time during which equipment is inoperative because of malfunction.

**DURATION, EFFECTIVE:** The time of mainstage operation of a rocket engine.

**DURATION, SHUTDOWN:** The interval between the time of shutdown signal and the time at which the thrust of the rocket engine is negligible.

**DURATION, TOTAL:** The total firing time of a rocket engine from the beginning of the thrust rise to shutdown.

**DURATION, TRANSITION:** The time interval from the initiation of the launch or mainstage signal to the beginning of mainstage operation.

**DYNAMIC:** Pertaining to or characterized by motion or mechanical force.

## GLOSSARY

### E

**EFFECTIVE PROPELLANT:** The total propellant less the propellant lost in starting and shutdown.

**EFFECTOR:** Refer to CONTROL ELEMENT.

**ELECTRICAL POWER DISTRIBUTION SYSTEM:** Distributes electrical power within the rocket engine.

**ELECTRICAL POWER SUPPLY SYSTEM:** One of the systems of the missile which supplies energy for the actuation of mechanisms and equipment.

**ELEVATION:** The inclination in degrees of the line of sight of the missile to its projection on the horizontal plane.

**ENGINE ENVELOPE:** The area which encompasses the complete propulsion system.

**ENGINE MOUNT ASSEMBLY:** Tubular steel structure which supports the rocket engine and which transmits engine thrust to the missile structure.

**ERASABLE:** Stored information, removable and replaceable by other information.

**ERECTOR TRUNNION ASSEMBLY:** The structure which supports the missile and missile trailer during erection.

**ERROR SIGNAL:** An electrical signal used to displace missile thrust chambers from a zero-reference position to correct for missile deviations from a desired flight altitude.

**EXERCISE:** A partial system test in which the inflight functions of the ground tracking equipment are dynamically simulated.

**EXHAUST SYSTEM:** All manifolds or stacks used for collecting and conducting exhaust gases to points of discharge.

**EXHAUST NOZZLE:** That portion of a thrust chamber which is on the downstream side of the nozzle throat.

**EXHAUST VELOCITY:** The velocity of exhaust gases of a rocket engine parallel to the engine axis, measured with respect to the engine.



## GLOSSARY

**EXIT CLOSURE:** The cap or cover used to seal the thrust chamber nozzle exit.

**EXPANSION AREA RATIO:** The ratio of the nozzle exit section internal area to the nozzle throat area.

**EXTRUDED GRAIN:** A solid propellant grain formed from propellant material in a solid state which is forced through a die under high pressure.

## GLOSSARY

### F

**FAIL-SAFE DESIGN:** A design feature of an assembly or system which causes the consequences from failure of a part of the assembly or system to be minimized.

**FAIRING:** A covering which produces a smooth outline to reduce drag or heat resistance.

**FAULT:** A defective part.

**FAULT LOCATION UNIT:** A panel containing indicators which show areas of malfunction during system operation or checkout.

**FEEDBACK TRANSDUCER:** A unit that measures one type of energy action and feeds the measured action to the device controlling the original action for comparison.

**FEEDER:** A cable to feed electrical energy from a source to a load or a distribution point.

**FILTER DIFFERENTIAL PRESSURE INDICATOR:** A unit which shows when the pressure drop across a filter exceeds the maximum allowable amount.

**FILTER-SEPARATOR:** A mobile unit through which fuel from the <sup>#</sup>storage tank is periodically passed to remove sludge and other impurities.

**FIN STABILIZED:** Directional stability of a projectile obtained by the action of aerodynamic restoring forces.

**FISSURING:** An undesired cracking or splitting of solid propellants.

**FLAG:** A signal sent to the computer indicating data of questionable validity.

**FLIGHT ANGLE:** Position of the missile in space in relation to the pitch, roll, and yaw axes along a predetermined trajectory.

**FLIGHT CONTROL SYSTEM:** An automatic system which maintains the desired conditions of flight stability and maneuvers the missile along a flight path determined by commands received from the guidance system.

## GLOSSARY

**FLIGHT PATH:** The moving position of the center of gravity of a missile with reference to a coordinate frame fixed either relative to the earth or the missile launching platform.

**FLIGHT READY:** In condition for the immediate start of launch countdown.

**FLIP-FLOP:** A bistable (always in one of two stable states) device having two input terminals and two output terminals.

**FLOW LIMITER VALVE:** A valve containing a spring-loaded spool which controls the flow of hydraulic fluid to a predetermined amount.

**FLOWMETER:** A device for showing the rate of flow of fluid.

**FLUID LEVEL INDICATOR:** A gage used to indicate the quantity of fluid in the hydraulic pumping unit reservoir.

**FM/FM:** Radio transmission involving a carrier, frequency-modulated by subcarriers which are themselves frequency-modulated.

**FORCE:** The dimension of the action which tends to produce a change in the motion of a material particle or set of particles.

**FREE FALL:** Accelerated only by gravity.

**FROZEN EQUILIBRIUM:** In the calibration of the theoretical specific impulse, the assumption that the molecular constitution of the gas throughout expansion in the exhaust nozzle remains the same as in the combustion chamber.

**FUEL-LEAN:** A fuel-oxidizer mixture containing less fuel than is optimum.

**FUEL-RICH:** A fuel-oxidizer mixture containing more fuel than is optimum.

## GLOSSARY

### G

**GANTRY CRANE:** A large crane operating from a frame structure raised on side supports.

**GAS:** A form of fluid wherein binding forces between the molecules are small, and the substance has a tendency to expand indefinitely.

**GAS GENERATOR:** An internal combustion device which burns propellants to provide gas pressure to operate turbopump turbines.

**GAS GENERATOR SYSTEM:** Produces gas pressure by combustion or catalytic decomposition of solid or liquid propellants for power.

**GATE:** A circuit having two or more input terminals and one output terminal, such that output is present when and only when prescribed inputs are present.

**GEE LINEAR (g):** The linear acceleration divided by the standard acceleration of gravity. A dimensionless parameter, used to refer to flight paths of missiles.

**GEE LOAD FACTOR ( $g_s$ ):** A parameter relating force and mass which satisfies the equation  $F=ma$  when  $F$  is expressed in pounds-force (lbf);  $m$  is expressed in pounds-mass (lbm). It is used to refer to internal conditions of stress on personnel or missile structure.

**GFE:** Government furnished equipment.

**GIMBAL:** A universal joint which allows a rocket engine or thrust chamber to move within limits.

**GIMBAL AXIS:** An axis perpendicular to the gyro spin axis and in line with the gyro output axis, which is oriented with its respective pitch, yaw, or roll axis.

**GIMBAL BEARING, GYRO:** One of several jewel bearings in which a gyro gimbal is mounted.

**GIMBAL MOUNT:** Essentially, a universal joint consisting of a cross-shaped bearing body by which the thrust chambers are mounted to the missile airframe.

## GLOSSARY

**GRAIN:** As applied to solid propellants, a single integral piece of propellant formed by extrusion or casting. In a solid propellant rocket engine, it may be used separately, cemented to other grains, or used collectively with other grains.

**GRAVITATIONAL ACCELERATION, LOCAL:** The gravitational acceleration measured from a point at rest with respect to a coordinate frame fixed relative to the earth.

**GRAVITATIONAL ACCELERATION, LOCAL EFFECTIVE:** The resultant acceleration to which a mass is subjected when it is acted upon by the vector sum of the Newtonian force of attraction, (which decreases with altitude) and the centrifugal or coriolis force (which increases with altitude and varies with latitude). The mass is considered to be at rest with respect to the surface of the rotating earth.

**GRAVITATIONAL ACCELERATION, STANDARD:** The numerical value of the gravitational acceleration internationally adopted at  $32.1740 \text{ ft/sec}^2$ .

**GRAVITATIONAL CONVERSION FACTOR:** A proportionality constant in the general relation  $F=ma$  to convert dimensions as well as units.

**GROUND SUPPORT EQUIPMENT (GSE):** Non-missileborne equipment required for functions in support of the missile.

**GROUND SUPPORT SYSTEM:** All specialized systems and equipment used for maintaining, testing, overhauling, assembling, disassembling, adjusting, calibrating, storing, transporting, handling, and servicing the missile.

**GUIDANCE:** The process of placing the missile into a ballistic trajectory during flight so the missile will reach a predetermined impact point.

**GUIDANCE COMMAND:** One of a series of coded signals from ground guidance used to start some missile subroutines and guide the missile in pitch and yaw into a predetermined ballistic trajectory.

## GLOSSARY

GYRO RE-ENTRY VEHICLE: A component of the nose cone terminal trajectory control subsystem rate switch which senses the rate of rotation in nose cone oscillation so as to initiate a dampening of that oscillation.

GYRO REFERENCES: The three axes of the frame of reference in space to which the three position gyros of the flight control system are aligned before launch.

## GLOSSARY

### H

**HANDLER:** An item used to retain, support, and transport an engine component while maintenance operations are being performed during storage or while the component is being installed.

**HANGFIRE:** The delayed ignition of the propellant or the igniter.

**HARD:** Protected against explosive pressure.

**HARDNESS:** Degree to which an installation is protected against explosive pressure measured in psi.

**HEAD, FLUID:** The pressure difference of a column of fluid of given density under various conditions.

**HEAD PRESSURE:** Helium pressure within the propellant tanks.

**HEAD SUPPRESSION:** Prevention of excessive fuel or oxidizer inlet pressure at the turbopumps.

**HEAD SUPPRESSION VALVE:** The sustainer main oxidizer valve, which varies the flow of oxidizer to maintain the current ratio between fuel pump discharge pressure and oxidizer dome pressure.

**HEATER RELAY:** A relay which is energized by a temperature-sensitive resistor and magnetic amplifier to apply 28 volts dc to a displacement gyro heater when the gyro temperature falls below a prescribed level.

**HEAT EXCHANGER:** A device which transfers heat from one fluid to another.

**HELIUM SHROUD:** A 250-liquid-gallon shell surrounding some of the helium spheres, filled with liquid nitrogen to keep the helium cool until launch.

**HIGH-PRESSURE PROPELLANT SUPPLY SYSTEM:** A propellant supply system which supplies the propellants at a sufficiently high pressure that a pump is not required in the propellant feed system.

**HOLD:** A halt in launch countdown before rocket engine ignition.

## GLOSSARY

**HYDRAULIC ACCUMULATOR:** A chamber for retaining hydraulic fluid under pressure.

**HYDRAULIC ACTUATOR:** A cylinder and piston which move a thrust chamber or rocket engine to change direction of thrust.

**HYDRAULIC PUMP:** A pump containing nine cylinders, and used to furnish hydraulic fluid under pressure to the actuators of the missileborne subsystems.

**HYDRAULIC <sup>PUMPING</sup> SUPPLY UNIT (HSU):** A unit of ground support equipment (GSE) used to furnish hydraulic pressure for filling and bleeding, testing, and pre-launch operations.

**HYPERGOLIC:** The ability of propellants to ignite spontaneously when mixed.

**HYSTERESIS SYNCHRONOUS MOTOR:** A constant speed electric motor, the speed of which is controlled by the magnetomotive hysteresis effect within the armature and field coils.



## GLOSSARY

### I

**IGNITER:** A pyrotechnic device which is electrically ignited to start the burning of propellants in a gas generator or thrust chamber.

**IGNITION STAGE:** The starting phase of rocket engine operation when propellants in limited quantities are introduced into the thrust chamber and burned.

**IGNITION SYSTEM:** The portion of the starting system which ignites the propellants in the thrust chamber(s) and the gas generator(s).

**IMPULSE:** The integral of the thrust over a specified duration.

**IMPULSE, EFFECTIVE:** The integral of the thrust over the effective duration.

**IMPULSE, SHUTDOWN:** The integral of the thrust over the shutdown duration.

**IMPULSE, TOTAL:** The integral of the thrust over the total duration.

**INCENDIARY AGENT:** A material which is used to set fire to installations either by scattering highly flammable material over an area or by creating an intense source of heat which is difficult to extinguish.

**INDICATOR:** A device which interprets and presents to the operator the measured value of a variable as received from a sensor.

**INDUCER:** A portion of a centrifugal pump which increases the pressure and whirl of the fluid before it reaches the main impeller.

**INERTIAL:** Pertaining to the resistance of matter to alteration in its state of motion; in ballistic practice, pertaining to the precessional characteristic of gyroscopes.

**INERTIAL GUIDANCE SYSTEM:** A system for programming the missile flight path by means of gyroscopes and a timer; the system is refired by radio guidance after staging occurs.

## GLOSSARY

**INERT MASS RATIO:** The ratio of the inert mass of any missile stage to the gross mass of that stage.

**INERT PROPULSION SYSTEM MASS RATIO:** The ratio of the inert mass of the propulsion system, in any missile stage, to the gross mass of that stage.

**INHIBITOR:** An inert material bonded to a solid propellant grain which prevents the burning of the propellant surface to which it is applied.

**INITIAL OPERATIONAL CAPABILITY (IOC):** The earliest stage, in the development of a weapon system, at which the weapon is able to function operationally.

**INJECTOR:** A perforated disc through which propellants are introduced into a thrust chamber or gas generator.

**IN-LINE MAINTENANCE:** The activities which sustain the operational capability of a system and <sup>which</sup> are performed at the operational location of the system.

**INNER GIMBAL:** A cylindrical structure pivoted at both ends on two jewel bearings and enveloped in viscous fluid to enable a virtually weightless mounting and to cut down friction within the stationary outer gimbal.

**INPUT AXIS:** An axis through the center of the gyro spin wheel perpendicular to the gyro spin and output axis.

**INSTALLATION:** A group of parts and assemblies, including attaching devices, in final position, on the engine mount assembly or airframe.

**INSTALLER:** An item of hardware designed to be used for positioning an engine component during installation in the missile.

**INTEGRATOR:** An electromechanical device, whose output is proportional to an input signal multiplied by time, which is used to accumulate steady-state error signals and swings the missile thrust chambers accordingly.

**INTRODUCTION:** A set of binary digits that specifies an operation to be performed and the address of an operand.

GLOSSARY

J

**JET PROPULSION:** A type of reaction propulsion in which the propulsive force is generated by accelerating fluid in an enclosed duct or passage.

**JETTISON:** To discard during flight.

## GLOSSARY

### L

**LAUNCH AND SERVICE BUILDING:** A concrete building containing a flame deflector and the remote-controlled storage and transfer equipment used for servicing a missile erected on its roof.

**LAUNCH AND SERVICE INSTALLATION:** A group of facility and ground support equipment (GSE) including a launch and service building, a launcher assembly, an erection trunnion assembly, and a missile service tower.

**LAUNCH COMPLEX:** One launch operations building, one guidance station, and three associated launch and service installations.

**LAUNCH CONTROL EQUIPMENT:** The units consisting of consoles, panels, sequencers and related equipment used to control and monitor systems during countdown.

**LAUNCH CONTROL OFFICER'S CONSOLE:** Refer to MISSILE LAUNCH CONTROL CONSOLE.

**LAUNCHER:** A device for holding a missile during erection, standby, and countdown, and for releasing it at launch. The launcher also holds the missile during a captive firing.

**LAUNCHER PAD:** Refer to LAUNCH PLATFORM.

**LAUNCH OPERATIONS BUILDING:** Reinforced concrete building which houses the remote control and monitoring equipment for three launch and service installations, and which protects the launch crew during launch operations; the blockhouse.

**LAUNCH OPERATOR AND ANALYST CONSOLE:** Refer to COUNTDOWN AND MONITORING CONSOLE.

## GLOSSARY

**LAUNCH PLATFORM:** The roof of a launch and service building, and the causeway to the access road.

**LAUNCH STATION:** Refer to LAUNCH COMPLEX.

**LIQUID SENSORS:** Capacity probes in the propellant transfer lines which detect the presence or absence of a propellant in the transfer lines.

**LOADING DENSITY:** In a solid-propellant rocket motor; the ratio of the volume of the propellant grain to the case volume, usually expressed in percentage.

**LOCKON:** The process of pointing the tracking antenna to the missile and starting to track the missile automatically.

**LOCKOUT:** A component of the re-entry vehicle fuse subsystem which blocks any spurious prearm signals until the missile has acquired verified trajectory or velocity.

**LOGISTICS:** Military support. That branch of the military art which embraces the details of the transport, quartering, and supply of troops in military operations.

**LONGERON:** A longitudinal structural member which distributes engine thrust uniformly to the body section of the missile.

**LONGITUDINAL AXIS:** Refer to ROLL AXES.

**LOW-DRAG FAIRING:** A conical cap fitted over the blunt re-entry vehicle of the missile to reduce air resistance during the upward flight of the missile through the dense part of the atmosphere. It is jettisoned just after staging, when the missile reaches thin air.

**LUBRICATION SYSTEM:** The system for both lubricating and cooling the shaft bearings, gear train, and related parts.

## GLOSSARY

### M

**MACH NUMBER:** The ratio of the velocity of a body to that of sound in the medium being considered.

**MAGAZINE:** A structure designed for the storage of explosives or ammunition.

**MAGNETIC AMPLIFIER:** A device using an adjustable inductor either alone or in combination with other circuit elements to secure amplification.

**MAINSTAGE:** Operation of the rocket engine at or above 90 percent of rated thrust.

**MAINTENANCE, DEPOT:** Maintenance of material which involves a major overhaul or complete rebuilding of parts, subassemblies and the end item, as required.

**MAINTENANCE, FIELD LEVEL:** In-line and shop maintenance activities.

**MAINTENANCE, ORGANIZATIONAL:** That maintenance authorized for and performed by an operating organization on its own equipment.

**MAINTENANCE, PREVENTIVE:** The routine inspection and servicing of equipment and facilities for the purpose of maintaining satisfactory operating condition.

**MAINTENANCE, SHOP:** Bench repair of components that have been removed from in-line equipment.

**MALFUNCTION:** Any condition in which equipment performance fails to meet operational standards.

**MANIFOLD:** A unit which contains internal porting passageways for directing fluid into channels.

**MANOMETER:** A missileborne instrument for measuring tank pressure of propellants.

## GLOSSARY

**MARGINAL CHECKING:** A preventive maintenance procedure in which the supply voltage or the clock frequency is varied about its normal value to detect and locate defective units.

**MARMAN CLAMP:** (Trade name.) A band-type clamp used to fasten large hoses or ducts together.

**MASS:** The dimension of quantity of matter. A primary engineering dimension whose basic engineering unit is the pound mass.

**MASS, DRY:** The mass of a missile (or portion thereof) which includes all payload, structure, control and guidance propulsion system, etc., but excludes gaseous and fluid supplies with which the vehicle is serviced prior to launch.

**MASS FLOW:** The mass of fluid passing through a particular reference plane per unit time.

**MASS, GROSS:** The mass of a missile which includes all payload, structure, control and guidance, propulsion system, propellants, gases, fluids, etc., which are carried at launch.

**MASS, INERT:** The mass of a missile or portion thereof which includes all payload, structure, control and guidance, propulsion system, propellants, gases, fluids, etc., which are carried at launch and which are not expended for propulsive power. Also the mass at the time of shutdown of the propulsion system.

**MASS, RATIO:** The ratio of the mass of the missile at launch to its mass at engine <sup>TV</sup>cutoff.  
A

**MASTER SEQUENCER:** A device that times and controls sequences of the

## GLOSSARY

various interrelated system functions during countdown.

**MEASURING MEANS:** Refer to SENSOR.

**MECHANICAL SHOCK:** Abrupt physical contact of one item with another, such as takes place when an item is dropped, thrown, or struck with another object.

**MEGGER:** A high-range ohmmeter having a built-in hand-driven generator as a direct voltage source.

**MEMORY:** A device which stores groups of words, including original input data, instructions, constants, and intermediate and final results.

**METER:** A device which receives a measure value of a variable from a sensor and indicates or records that value.

**MICRON:** One one-thousandths of a millimeter.

**MIL:** A unit of angular measurement; in missile usage, a mil is equal to 1/6400 of a circle; also a unit of linear measurement equal to 0.001 inch.

**MISSILE ASSEMBLY BUILDING:** A building located in the squadron maintenance area reserved for the assembly, disassembly, inspection, maintenance, repair and general servicing of the missiles.

**MISSILE LAUNCH CONTROL CONSOLE:** A desk fitted with controls and indicators at which the launch control officer observes and commands countdown functions.

**MISSILE MAINTENANCE AREA:** An area of the missile assembly building reserved for the receipt, inspection, maintenance, and storage of a missile.

**MISSILE SYSTEMS CHECKOUT PROGRAMMER:** A table console and associated equipment racks comprised of function generators, memory circuits, analog-to-digital converters, comparators, and readout unit. **MISSILE SYSTEMS CHECKOUT PROGRAMMER (APCHE)** is used to automatically isolate equipment failures and sequentially test flight control system components.



## GLOSSARY

**MISSILE TRACKER:** A system of electronic equipment that obtains angle and distance information and determines missile position.

**MIXTURE RATIO:** The ratio of the oxidizer consumption rate to the fuel consumption rate.

**MIXTURE RATIO, EFFECTIVE:** The ratio of the mass of oxidizer consumed during the effective duration to the mass of the fuel used during the effective duration.

**MOBILE MAINTENANCE:** Corrective maintenance performed at the launch complex under emergency conditions with portable equipment.

**MOBILE TAINER:** A container designed to contain one of the several propulsion system components.

**MODEL SPECIFICATION:** A document which sets forth the characteristics, performance, or other parameters of a device (e.g. a rocket engine) which is to be produced.

**MODULATION:** Information in electrical form superimposed upon a carrier wave.

**MODULE:** A combination of components, contained in one package or so arranged that together they are common to one mounting, which provides a complete function or functions to the subsystems and/or systems in which they operate.

**MONITORING:** A continuous attempt to receive information to confirm that a specific condition exists or action occurs.

**MONITORING AND POWER-ON MAINTENANCE:** Maintenance which does not interfere with equipment operation.

**MONOCOQUE:** A type of airframe construction characterized by stressed skin and the absence of stiffening framework.

## GLOSSARY

**MONOPROPELLANT:** A propellant containing an oxidizing agent and combustible matter in a single substance.

**MOTOR-DRIVEN ARMING SWITCH:** The combination of a hysteresis motor and cam-actuated microswitches used to provide sequential switching patterns which arm and disarm missile subroutine mechanisms.

**MOTOR-DRIVEN POSITION TRANSDUCER:** A rotary transformer capable of producing variable electrical output for a given mechanical input from the integrator gear train.

**MULTIPLE-COIL PICKOFF:** An arrangement of an induction-type rotor and a matched stator used in gyroscopes to provide an output signal proportionate to the angular rotation of an inner movable gimbal.

## GLOSSARY

### N

**NACELLE:** A flared skirt which covers the booster engine thrust chamber.

**NAUTICAL MILE:** One minute of arc of the earth's circumference; about 6080 feet; or  $1\frac{1}{7}$  ordinary statute miles.

**NOZZLE:** A duct of changing cross-sectional area in which fluid velocity is increased.

**NULL:** A condition of minus signal, indication or position.

## GLOSSARY

### 0

**OCTAL:** Pertaining to the number system with the base 8.

**OIL COOLER:** A water-cooled, shell and tube type unit used to dissipate excess heat from the hydraulic fluid.

**OIL EVACUATION CHAMBER:** A gas-charged cylinder containing a piston which withdraws fluid from the missileborn hydraulic subsystems.

**ONE-AND-ONE-HALF STAGE:** A missile configuration in which the booster engine is jettisoned, but the booster propellant tanks are retained.

**ONES COMPLIMENT:** The ones compliment of the magnitude of a given binary number is the result of subtracting each successive digit from unity; equivalently, it is the result of changing every 1 to 0 and every 0 to 1 in the given number.

**ONE-DEGREE-OF-FREEDOM GYRO:** A gyre with only one set of bearings in addition to the rotation bearings.

**OPERATIONAL MODE:** (Flight Control System) Operation of the flight control system during launch operations and during the controlled portion of missile flight.

**ORIENTATION:** Relationship of the axis of a body to a set of coordinate axes.

**ORIFICE:** A fixed restriction in a passage to control the rate of fluid flow.

**O-RING:** A circular gasket or seal having an O shaped cross section.

**OUTER GIMBAL:** A cylindrical or ring shaped stationary structure which houses a gyro spin wheel within an inner gimbal enveloped in a viscous fluid to enable free suspension of the gyro spin wheel.

## GLOSSARY

**OUTRIGGER:** A bracket projecting from the side of the thrust chambers and used as an attaching point for a hydraulic actuator.

**OXIDATION:** The process of adding oxygen to a substance or combining a substance and oxygen.

**OXIDIZER:** A substance which supports the combustion of fuel.

**OXIDIZER DOME:** That section of a thrust chamber which receives oxidizer from the oxidizer valve and directs it to the injector.

## GLOSSARY

### P

**PAD:** A permanent or semi-permanent load-bearing surface constructed or laid  
/ ~~on~~ on the ground upon which a permanent or mobile catapult or launcher  
can be placed.

~~XX~~

~~XX~~

**PART:** The least subdivision of a system; an individual piece having an inherent functional capability but unable to function without the interaction of other parts or forces, and ordinarily not subject to further disassembly without destruction.

**PHASE:** A period of flight.

**PILLOW BLOCKS:** The support housing for the gimbal bearings.

**PITCH:** Missile movement which alters climbing or diving angle.

**PITCH ANGLE:** The number of degrees of missile displacement about the lateral or pitch axis.

**PITCH ATTITUDE:** The position of the missile in the pitch plane; that is, nose up or nose down.

**PITCH AXIS:** An axis through the center of mass of the missile perpendicular to the roll axis and about which the missile pitches nose up or nose down.

**R-X AXIS:** An axis through the center of mass of the missile.

**PITCH COMMAND:** A signal to change the pitch of the missile, conveyed by a binary number proportional to the desired rate of change of pitch.

**PITCHOVER:** The maneuver by which the missile is tilted into the nominal flight attitude from the vertical attitude in which it was launched.

## GLOSSARY

**PITCH PLANE:** An area in space encompassing the orbital movement of the missile about its pitch axis.

**PLUG-IN UNIT:** A circuit which can be removed and replaced as a unit.

**PNEUMATIC:** The application of air <sup>or gas</sup> ~~engine~~ pressure to operate equipment or actuate systems and components.

**PNEUMATIC POWER DISTRIBUTION SYSTEM:** Distributes pneumatic power (pressurized gas) within the missile power plant. It consists largely of valves and piping.

**PNEUMATIC POWER SUPPLY SYSTEM:** One of the actuating systems of an air vehicle which supplies pneumatic power (pressurized gas) to the pneumatic power distribution system of the rocket engine.

**POD:** A protective cover fastened to the skin of the missile for one or more canisters.

**POPPET VALVE:** A disk valve borne on a stem and having motion in the line of its axis.

**POSITION TRANSLATOR:** The feedback circuit of computer-comparator.

**POWER CONTROL SYSTEM:** Denotes the complete rocket engine control system.

**POWER PACKAGE:** The assembly of two booster turbopumps, the booster gas generator, and associated pneumatic, electrical, and lubricating systems.

**PRECESSION:** A variation in the orientation of the axis of a gyroscope.

**PROGRAM:** The predetermined sequence of instructions which the computer executes in the solution of a problem.

**PROGRAMMER:** The combination of a motor and cam-driven switches divided into rotational sections representing periods of time to produce sequential

## GLOSSARY

switching patterns. The switching patterns initiate the various subroutines for missile flight control.

**PROJECTILE:** A body which is accelerated to a velocity by the application of mechanical forces and which continues its motion along a ballistic trajectory.

**PROPELLANT:** A mixture of fuel and oxidizer used for rocket propulsion.

**PROPELLANT MIXTURE RATIO:** The ratio of the weight of the oxidizer to the weight of the fuel supplied to a combustion chamber.

**PROPELLANT FEED SYSTEM:** The portion of a liquid propellant rocket engine which moves the main propellants from the propellant supply system lines to the thrust chamber assembly.

**PROPELLANT SUPPLY SYSTEM:** Comprises missile tanks for main propellants, tank pressurization system(s), valves, sensors, actuators, and piping to supply the propellants to the propellant feed system of the rocket engine.

**PROPELLANT UTILIZATION SYSTEM:** A missileborne system for controlling propellant mixture ratio to attain maximum missile range.

**PROPELLANT UTILIZATION VALVE:** The sustainer main fuel valve which varies the flow of fuel to the engine. It is controlled by the propellant utilization system.

**PROPULSION SYSTEM:** The portion of a missile whose function is to provide thrust.



## GLOSSARY

Q

**QUADRANT:** One of four sections of the missile formed by the X-X and the Y-Y planes.

**QUICK DISCONNECT:** A fitting designed to seal both sections of a connection automatically upon separation from each other.

## GLOSSARY

### R

**RADIAL RANGE:** The straight-line distance from the position-tracking radar antenna to the missile.

**RADIATION:** The emission and propagation of waveform energy.

**RANGE/RATE (R):** The rate of change in feet per second of the direct distance of the missile from the central rate antenna.

**RATE GYRO:** A gyroscopic device which provides an electrical signal proportional to its rate of angular displacement from a null reference line which is oriented in the pitch, roll, or yaw missile axis.

**RATE SWITCH:** A gyro-controlled switch that senses angular velocity about a particular axis of rotation.

**READINESS STATE:** The status of a given missile with respect to the time necessary to launch it.

**RECEPTACLE:** An electrical connector usually attached to an electrical component or to a bracket or panel.

**RECYCLE:** Inspection and possible replacement after a specified elapsed time, or number of operations.

**REDUCTION GEAR TRAIN:** A series of gears in the integrator designed to reduce the angular velocity or revolutions-per-minute of a given input.

**RE-ENTRY:** The return of the nose cone from space into the dense atmosphere.

**REFERENCE GYRO:** Gyroscopic device<sup>2</sup> used to sense the amount and rate of missile displacement from a pitch, roll, or yaw reference axis.

**REFERENCE TRANSFORMER:** An excitation or power source for feedback transducers; also, a voltage step-down transformer in the serve-amplifier

## GLOSSARY

demodulator circuit.

**REGENERATIVELY COOLED:** Refers to a combustion chamber wherein the chamber walls are cooled by the transfer of heat to liquid which is subsequently injected into ~~the~~<sup>and</sup> reacts in the combustion chamber.

**REGISTER:** A device for storing one word.

**REGULATOR:** A device which senses and controls automatically.

**RELIEF VALVE:** A spring-loaded valve used to relieve a system of pressure exceeding a preset amount.

**REMOTE SET VOLTAGE SOURCE:** An electromechanical device consisting of an a-c motor that drives a variable transformer used to remotely control the amount of voltage for the roll program prior to launch.

**RESERVOIR:** A container used to hold reserve fluid.

**RESET:** To restore a register or counter to a prescribed state, usually zero.

**RESIDUAL CAPACITANCE:** Capacitance of manometer when it contains no mercury.

**RETARDING ROCKETS (Retrorockets):** A pair of solid propellant rockets attached, pointing to the side of the missile body in the forward end of the upper pod. They are fired to retard the firing movements as the re-entry vehicle is being separated from body.

**ROCKET:** An air vehicle or projectile which uses the principles of rocket propulsion for acceleration.

**ROCKET ENGINES:** Those portions of the propulsion system which supply thrust or propulsion power to the missile.

**ROCKET ENGINE MAINTENANCE STAND:** A structure designed to accommodate the

## GLOSSARY

sustainer engine or either of the booster engine thrust chambers for flushing, purging and servicing.

ROCKET PROPULSION SYSTEM: A term denoting a rocket engine assembly - particularly an engine with several thrust chamber assemblies.

ROLL ANGLE: The number of degrees of missile displacement about the longitudinal or roll axis.

ROLL: Rotation of the missile around its longitudinal axis.

ROLL ATTITUDE: The position of the missile in the roll plane; the amount of clockwise or counter-clockwise rotation.

ROLL AXIS: The horizontal axis, in the plane of symmetry, <sup>parallel</sup> ~~perpendicular~~ to the axis of the thrust line of the engines. The ROLL AXIS is sometimes referred to as the longitudinal axis.

ROLL PLANE: An area in space encompassing the orbital movement of the missile about its roll axis.

ROLL PROGRAM: Rotation of the missile about its roll or axis until the target pod faces a predesignated target.

## GLOSSARY

### S

**SCRAMBLED TELETYPE:** A system in which a typewriter encodes messages mechanically and transmits them electrically to another typewriter which decodes them.

**SCRUB:** Refer to CANCELLATION:

**SECURITY COVER:** Covering which conceals and protects the missile while it is on the trailer.

**SELF-CONTAINED GUIDANCE COMMAND:** One of a series of electronic signals generated by the flight programmer to start missile subroutines or back up command signals from ground guidance.

**SENSOR:** A device which measures or senses a variable for transmission of the information to a controller or meter.

**SEPARATION:** The parting of the re-entry vehicle from the missile airframe while in flight.

**SEQUENCER:** Refer to PROGRAMMER.

**SERVOAMPLIFIER:** An electronic device which amplifies and converts an alternating electrical input signal to a direct current output which is used to actuate electrohydraulic servovalves. The unit employs a feedback circuit which compares the output and input signals to control thrust chamber displacement.

**SERVO CIRCUITS:** Automatic, electro-mechanical, closed loops characterized by an error-detected<sup>ing</sup> device connected to an error-correcting signal generator, which is in turn connected to a device capable of reducing the detected error in response to the error-correcting signal.

**SERVO CONTROLLER:** A device which converts a command signal into hydraulic power to operate a valve.

## GLOSSARY

**SERVO NULL LOOP:** A control circuit using a combination (or loop) of devices which maintain a zero voltage difference between the input and output.

**SERVOVALVES:** Electrohydraulic valves which act in response to flight control signals.

**SHUTDOWN:** The turning off of a rocket engine by closing the propellant valves.

**SIGHT-DOMES:** Small glass bulbs mounted on each side of a hydraulic tank which allow the position of the plungers to be observed.

**SIGN-BIT:** The initial bit used to designate the algebraic sign of a number.

**SIGNED MAGNITUDE:** The form of a number in which an initial sign bit is followed by true magnitude bits.

**SILICONE FLUID:** A highly viscous fluid enveloping a gyro inner gimbal to float the gyro spin wheel and damp undesirable gimbal motion.

**SINGLE-DEGREE-OF-FREEDOM:** The ability of a gyro inner gimbal to rotate about its single or output axis.

**SINGLE-START TYPE:** A term that applies to a rocket engine system using self-consuming pyrotechnic igniters to ignite the propellants.

**SKIRT:** The split cover used to surround the thrust chamber body and protect it from damage.

**SLING:** An item of hardware which is designed to lift a component by cradling it in flexible bands, the ends of which are fastened to the hoist hook.

**SOFT:** Unprotected against explosive pressure.

**SPIN AXIS:** An axis through the center of the gyro spin wheel, perpendicular

## GLOSSARY

to the output axis and about which the gyro spin wheel rotates.

**SPINNING WHEEL:** The flat cylinder or disc section of a gyro which is accelerated to high revolutions-per-minute to bring about precession.

**SPRING-LOADED GIMBAL:** A gyro inner gimbal connected on one end to a torsion bar which restrains gimbal rotation at a predetermined rate.

**SPRING RESTRAINT:** A copper torsion rod attached to a rate gyro case and inner gimbal to govern and restrain the rotation of the inner gimbal at a rate proportional to the movement of the gyro case about its input axis and return the gimbal and spin wheel to a null position.

**SPUR-GEAR TRAIN:** Gearing composed of toothed wheels having external radial teeth.

**SQUADRON MAINTENANCE AREA (SMA):** The area in the cantonment portion of the base and in the guidance station in which squadron bench maintenance is performed.

**SQUIB:** An electrically detonated explosive device.

**STAGE(OR <sup>F</sup>A MISSILE):** The tankage and propulsion equipment of a missile which is jettisoned after a portion of the total propulsion period.

**STAGING:** Booster engine cutoff and booster section jettisoning.

**STANDBY:** The period after checkout and prior to start of countdown.

**STANDBY STATUS INDICATOR:** A unit containing indicators which show the condition of missile systems during periods of standby.

**STATIC FIRING:** Engine operation with the missile firmly secured to the launcher to prevent takeoff.

**STATION NUMBER:** The number of inches from a basic reference plane.

## GLOSSARY

**STEADY STATE CONTROL SIGNAL:** An electrical signal generated within the flight control system to compensate for steady-state flight errors.

**STEADY-STATE ERROR:** An action or condition inherent in the missile which tends to unbalance or upset a stable missile attitude, such as: thrust unbalance, aerodynamic instability and throat chamber misalignment.

**STEP:** To change the content of a counter by one.

**STRETCH:** Longitudinal tension applied to the missile tank section.

**STUB POD:** The larger of the two pods on the target side of the missile.

**SUBROUTINE:** One of several events, such as booster cutoff and staging sequences, which occur at specific intervals of time to enable the missile to deliver its warhead onto a predetermined ballistic trajectory.

**SUMMING NETWORK:** An electrical circuit which combines two or more voltages to form a signal control.

**SUSTAINER ENGINE:** The main rocket engine attached to the missile fuel tank which does not separate from the missile during powered flight.

**SUSTAINER PHASE (STAGE):** The period of missile flight between staging and sustainer cut-off.

**SYSTEM ERROR:** An error induced into the circuitry of the flight control system by steady-state errors.

**SUBSYSTEM:** A single module, or a combination of modules, plus independent components that contribute to modular functions, all interconnected and interrelated within a system and performing a specific system function.



## GLOSSARY

### T

**TACHOMETER GENERATOR:** An electro-mechanical device used in the flight control system integrator to convert a mechanical angular velocity input into an electrical signal.

**TACTICAL FLIGHT:** A military flight of a missile to a predesignated target.

**TARGET AZIMUTH:** The clockwise angle in degrees of vertical arc between a north point and the line of sight projecting from the missile to a predesignated target.

**TARGET POD:** The bubble pod and the stub pod; located on the target side of the missile.

**TERMINAL TRAJECTORY:** That portion of the trajectory of the re-entry vehicle between separation and detonation.

**TERMINAL TRAJECTORY CONTROL:** A subsystem of the re-entry vehicle that orients it, dampens its oscillations, and stabilizes it during re-entry.

**THERMONUCLEAR:** A nuclear reaction characterized by fusion, at very high temperatures.

**THRUST:** The useful reaction in a rocket engine which propels the missile.

**THRUST ALIGNMENT SLIDES:** Slides used to center the thrust chamber in such a way that engine thrust will be delivered along the roll of the missile.

**THRUST CHAMBER:** The combustion and expansion chamber of a rocket engine, in which propellants are burned to produce thrust.

**THRUST CHAMBER DISPLACEMENT:** The amount of displacement of the thrust chambers from a zero reference position along the roll axis of the missile.

## GLOSSARY

### T

**THROAT:** The smallest cross-sectional area of the thrust chamber.

**THRUST DECAY:** The decrease in thrust which occurs at shutdown of a rocket engine.

**THRUST UNBALANCE:** The difference in the amount of thrust generated in the dual thrust chambers of a rocket engine caused by a difference in the ratio of propellant mixtures for each chamber.

**TIME BASE:** The reference measure for the duration of an event or series of events by the order in which they occur.

**TORQUE:** A twisting force.

**TORQUE INPUT:** The magnitude of gyro displacement from a null position proportional to the amount of rotation of the gyro case about its input axis or input signal applied to the torquer generator stator windings.

**TORQUE AMPLIFIER:** An electronic device used to amplify electrical signals fed to gyro stator windings; to displace a gyro spin wheel in the amount proportional to the amplitude of the input signal.

**TORQUE OUTPUT:** The magnitude of rotation at the output axis of a gyro gimbal, proportional to the amount of gyro displacement from a null position.

**TRAJECTORY:** The curve traveled by a re-entry vehicle after separation.

**TRANSDUCER:** A device used to convert energy <sup>such as electrical, mechanical, hydraulic, etc.,</sup> from one system to another. The output energy may be of the same form as the input energy or it may be any one of the different forms of energy.

**TRANSDUCER ACTUATOR** An electrical device whose output is proportional to actuator movement.

**TRANSPONDER:** A device which receives, strengthens, and retransmits a radio signal.

## GLOSSARY

**TRIANGULATION:** A method of locating an object by cross bearings from two or more observation points.

**TRICHLORETHYLENE:** A colorless, non-flammable fluid used as a cleaning solvent.

**TRUNCATED (ONE):** The remaining portion of a cone whose vertex is cut off, usually paralleled to the base.

**T-TIME:** Designates a sequence of events which take place during maintenance checkout or pre-launch checkout of the missile system. T-Time begins officially 15 minutes before the venting of the holdown mechanism and ends, ideally, with the venting. T-Time is interrupted in case of delays, holds, or stops, and is not to be confused with actual time taken to launch the missile.

## GLOSSARY

### U

ULLAGE: In a propellant tank, that part of its volume not occupied by propellant.

ULTIMATE OPERATIONAL CAPABILITY: The ability to launch production-model missiles from hard tactical bases.

UMBILICAL: Cable which connects a missile to ground support equipment and is disconnected as the missile is launched.

UNIT: A combination of parts comprising a definable entity of a component and possessing a functional potential essential to the proper operation of that component.

UNIVERSAL ROTATIONAL FREEDOM: The ability of a gyro to rotate in any direction.

UPPER POD: The largest of the three missile pods. It is on the upper side when the missile is stabilized in horizontal flight.

## GLOSSARY

### V

**VALVE POSITION LIMITER:** A circuit used to prevent the propellant utilization valve from opening or closing more than a preset amount.

**VARIABLE RELUCTANCE TRANSFORMER:** A transformer in which the secondary voltage may be controlled by varying the inductance.

**VECTOR:** A magnitude with a direction.

**VECTOR VELOCITY:** A velocity expressed with a certain magnitude and direction.

**VERNIER:** An auxiliary device used with a main device to obtain fine adjustment.

**VERNIER ENGINE:** A relatively small rocket engine mounted on the missile fuel tank. The two vernier engines assist in guidance and control of the missile.

**VERNIER PHASE (STAGE).** The period of missile flight between sustainer cutoff and vernier cutoff.

**VORTEXING:** ~~A~~ forming a whirlpool.

## GLOSSARY

### W

**WARHEAD:** The portion of the armament system of a guided missile or projectile which consists of explosive, chemical incendiary, or other contents that can inflict the intended damage on the target.

**WORD:** Any ordered set of bits that is handled as a unit in a computer.

## GLOSSARY

### X

**X-DAY:** The 24-hour period in which a static or flight test occurs.

**X-N DAY ACTIVITY:** Any organized operation, including checkout, maintenance, adjustment, calibration, repairing, and removing or replacing, which is relevant to a flight test and is referenced to the final planned date of subject operation.

**X-X AXIS:** The pitch axis.

## GLOSSARY

### Y

**YAW:** The degrees of the angle, in the horizontal plane, between the longitudinal axis of the airframe and the flight path.

**YAW ANGLE:** The number of degrees of missile displacement about the vertical or yaw axis.

**YAW ATTITUDE:** The position of the missile in the yaw plane; that is, nose left or nose right.

**YAW AXIS OR Y-Y AXIS:** An axis through the center of gravity of the missile, perpendicular to the longitudinal axis and in the plane defined by the longitudinal axis and the <sup>line</sup>~~line~~ through the centers of the booster engine mounts.  
A

**YAW COMMAND:** A command to change the yaw attitude of a missile.



## GLOSSARY

Z

Z-Z AXIS: The longitudinal axis.

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